Chapter 4

RESULTS

This chapter will present the results of this study and it can be further divided into three sections: 1) descriptive data; 2) test-retest reliability and 3) Pearson's product moment coefficient of correlations.

4.1. Descriptive Data

Mean scores (speed jump index) of the speed jump test at 2, 3, 4 and 5 repetitions for all subjects and for both groups that have been training for more than 2 years (S > 2 tr yrs) and less than two years (S < 2 tr yrs) during the first and second session are depicted in table 4.1. Mean scores (speed jump index) in the speed jump test for all subjects if 2, 3, 4 and 5 repetitions are performed are 151.61(45.84), 144.10(40.10), 142.21(43.75) and 142.11(43.36)cms^{-1} respectively. The mean score for the group of S > 2 tr yrs are 176.17(48.15), 164.11(40.89), 164.07(48.34) and 163.79(48.24)cms^{-1} for 2, 3, 4 and 5-repetition speed jump respectively. As for the group of S < 2 tr yrs, the mean scores for the speed jump test index are 124.60(23.38), 122.10(26.26), 118.17(20.75) and 118.26(19.63)cms^{-1} for 2, 3, 4 and 5-repetition speed jump respectively.

Table 4.1 Mean scores of the speed jump test at various repetition for all subjects and for both the subjects that have been training for more than and less than two years during the first and second session. Mean(SD).

Speed Jump Test	All subjects (n = 21)	> 2 training years (n = 11)	< 2 training years (n = 10)
First session			
2-repetition	151.61 (45.84)	176.17 (48.15)*	124.60 (23.38)
3-repetition	144.10 (40.10)	164.11 (40.89)*	122.10 (26.26)
4-repetition	142.21 (43.75)	164.07 (48.34)*	118.17 (20.75)
5-repetition	142.11 (43.36)	163.79 (48.24)*	118.26 (19.63)
Second session			
2-repetition	148.46 (59.95)	n/a	n/a
3-repetition	140.50 (57.04)	n/a	n/a
4-repetition	138.63 (56.13)	n/a	n/a
5-repetition	132.60 (52.14)	n/a	n/a

Note: * Indicates significance at level $p < 0.05$.
n/a = not applicable.

Discriminant analysis was performed across all the 2, 3, 4 and 5-repetition speed jump between both the S > 2 tr yrs and S < 2 tr yrs groups using Student's *t*-Test to investigate if the speed jump test was able to differentiate between performance level of S > 2 tr yrs and S < 2 tr yrs group. It was then revealed that the mean scores (speed jump index) for S > 2 tr yrs were significantly higher than S < 2 tr yrs across all the 2, 3, 4 and 5 -repetition speed jump at the level of $p < 0.05$. These results suggested that all the 2, 3, 4, and 5 repetition speed jump test was able to differentiate between levels of performance in repetitive speed jumping ability.

As for speed strength measure, six variables were derived from three speed strength test and the mean scores for all subjects, S > 2 tr yrs and S < 2 tr yrs are presented in table 4.2.

Table 4.2 Mean scores for all the speed strength tests for all subjects and subjects that have been training for more and less than two years. Mean (SD)

Variables	All Subjects n = 21	S > 2 years n = 11	S < 2 years n = 10
VJH (cm)	61.01 (8.84)	64.42 (8.56)*	57.28 (7.91)
F10m (ms)	1997 (104)	1966 (69)	2032 (127)
L30m (ms)	4153 (200)	4066 (154)*	4248 (207)
40m (ms)	6150 (270)	6032 (184)*	6279 (298)
CDJH (cm)	-	41.89 (5.82)	-
BDJ_{in} (cms^{-1})	-	158.88 (22.50)	-

Note: * Indicates significance level at $p < 0.05$. VJH = vertical jump height, F10m = first 10m time in 40m sprint, L30m = last 30m time in 40m sprint, CDJH = countermovement drop jump height and BDJ_{in} = bounce drop jump index.

For vertical jump height (VJH), the subjects' mean score was 61.01(8.84) cm. The S > 2 tr yrs group mean vertical jump height score was 64.42 (8.56) cm whereas the S < 2 tr yrs group have a mean score of 57.28(7.91) cm. The 40-meter dash test was divided into three performance variables, namely the first 10-meter time in 40-meter dash (F10m), last 30-meter time in 40-meter dash (L30m) and 40-meter dash (40m) time. Mean score for the subjects in the F10m was 1997(104) ms. The S > 2 tr yrs group had a mean score of 1966(69) ms and the S < 2 tr yrs group had a mean score of 2032(127) ms. For 40m, the subjects' mean score was 6150(270) ms with the S > 2 tr yrs group having a mean score of 6032(184) ms and the S < 2 tr yrs group having a mean score of 6279(298) ms. The subjects' mean score for L30m was 4153(200) ms with the S > 2 tr yrs group having a mean score of 4066 (154) ms and the S < 2 tr yrs group at 4248(207) ms. As the S < 2 tr yrs group didn't perform the counter-movement drop jump test and bounce drop jump test, the S > 2 tr yrs group's mean scores for counter-movement drop jump height (CDJH) and bounce drop jump index (BDJ_{in}) were 41.89(5.82) cm and 158.88 (22.50) respectively.

Student's *t*-Test was performed to study group performance differences in speed strength tests and the results revealed that the S > 2 tr yrs group scores significantly higher and faster than the S < 2 years group in three performance variables, the VJH, 40m and L30m ($p < 0.05$).

For reference purpose, the best score of each subject in the speed jump test and all the speed strength test across all the 4 repetitions range is shown in table 4.3.

Table 4.3 Subjects' score in the speed jump test.

Subjects	Speed Jump Index (cms^{-1})			
	2 repetitions	3 repetitions	4 repetitions	5 repetitions
1	158.119	150.400	156.052	151.234
2	213.479	180.474	160.578	161.960
3	121.313	121.677	120.237	123.714
4	126.328	124.354	124.031	122.914
5	131.187	174.916	146.929	143.831
6	133.891	130.519	131.624	128.896
7	86.102	88.348	89.874	86.258
8	199.150	175.789	187.520	180.690
9	179.457	186.554	186.378	185.636
10	169.889	168.234	160.587	154.214
11	148.113	134.679	125.896	127.559
12	106.947	100.099	94.482	101.499
13	117.554	95.892	100.013	109.838
14	96.303	95.962	93.641	96.133
15	241.670	230.481	253.139	258.954
16	136.886	140.894	135.266	134.570
17	167.513	144.918	146.508	143.582
18	133.195	125.181	116.295	115.806
19	260.048	222.898	231.972	232.074
20	117.723	109.709	102.943	99.917
21	139.032	124.165	122.485	125.046

Table 4.4 Subjects' scores in speed strength tests.

Subjects	VJH (cm)	F10m (ms)	L30m (ms)	40m (ms)	CDJH (cm)	BDJ_{in} (cms^{-1})
1	59.69	1922	4047	5969	42.686	151.54
2	68.58	1917	4127	6044	45.778	157.84
8	74.93	2059	4019	6078	47.594	166.55
9	82.55	1915	3749	5664	54.065	204.91
10	64.77	1905	3960	5865	38.868	167.82
12	63.5	1915	4053	5968	40.684	161.51
15	62.23	2053	4264	6317	39.423	161.11
16	57.15	1961	4164	6125	37.772	143.38
18	54.61	1994	4307	6301	31.521	112.34
19	54.61	2080	3953	6033	41.109	147.54
21	66.04	1900	4087	5987	41.251	173.13
3	50.8	1949	4484	6433	n/a	n/a
4	59.69	2136	4247	6383	n/a	n/a
5	59.69	1989	4163	6152	n/a	n/a
6	64.77	1830	4123	5953	n/a	n/a
7	44.45	2074	4356	6430	n/a	n/a
11	72.39	1969	3914	5883	n/a	n/a
13	53.34	2024	4360	6384	n/a	n/a
14	50.8	2230	4548	6778	n/a	n/a
17	58.42	1921	3968	5889	n/a	n/a
20	58.42	2196	4313	6509	n/a	n/a

Note: n/a = non applicable

4.2 Reliability Analysis

The establishment of reliability involved three statistical analysis in this study. Cronbach's alpha coefficient was calculated to study the internal consistency of the Speed Jump Test. Pearson's correlation coefficient was computed to indicate relative reliability whereas paired t-test was carried out to detect systematic bias. Results are depicted in table 4.5.

Table 4.5 Discriminant analysis using *t*-Test and Pearson's correlation coefficients of the speed jump at various repetitions.

Speed Jump Test	Alpha Coefficient	Pearson's Correlation Coefficient	*t*-Test
2-repetition (n=16)	0.909	0.850**	non-significant
3-repetition (n=16)	0.918	0.891**	non-significant
4-repetition (n=16)	0.949	0.918**	non-significant
5-repetition (n=16)	0.949	0.907**	non-significant

Note: ** Indicates significance level at $p < 0.01$.

The Cronbach's alpha coefficient across 2, 3, 4 and 5-repetition speed jump test were 0.909, 0.918, 0.949 and 0.949 respectively. This will suggest that the all the 2, 3, 4 and 5-repetition Speed Jump Test is consistent internally.

The speed jump test indexes across all the 2, 3, 4, and 5-repetition speed jump test during the first session were proven to be significantly correlated to the speed jump test indexes measured during the second session with the Pearson's product moment correlation coefficient of 0.850, 0.891, 0.918 and 0.907 for 2, 3, 4 and 5 jumps speed jump test respectively.

Student's *t*-Tests conducted showed that there was no significant difference between the speed jump test indexes during the first and second session across all the 2, 3, 4 and 5-repetition speed jump test.

4.3 Pearson's Product Moment Correlation Coefficient

Pearson's product moment correlations were computed independently between six performance variables measured from three speed strength test and the speed jump test at various jumping repetitions to validate the speed jump test and to study the different characteristics of speed jumping ability. The results are depicted in table 4.6.

Table 4.6 Pearson's product moment coefficient of correlations between speed jump index at various repetitions and six speed strength measures.

Performance Variables	Speed Jump Index (cms^{-1})			
	2-repetition	3-repetition	4-repetition	5-repetition
VJH	0.423	0.446*	0.401	0.389
F10m	-0.132	-0.158	-0.100	-0.098
40m	-0.433	-0.445*	-0.391	-0.369
L30m	-0.517*	-0.520*	-0.477*	-0.449*
CDJH	0.288	0.325	0.301	0.286
BDJ_{in}	0.135	0.235	0.235	0.235

Note: * Indicates significance at level of $p<0.05$.

All the speed jump index for 2, 3, 4 and 5 repetition speed jump test correlated significantly with L30m ($p < 0.05$) with the largest zero-order correlation being the 3 repetitions speed jump index at – 0.520 ($p<0.05$). The 3-repetition speed jump index also correlated significantly to VJH at 0.446 ($p < 0.05$) and 40m at 0.445 ($p < 0.05$). This indicated that 27% and 20% of the total variance in the 3 repetitions speed jump index could be explained or accounted for by the variance in L30m and VJH respectively. L30m in this context is a measure of the speed-maintaining phase of leg speed whereas VJH is a measure of leg power.

The 2, 4 and 5-repetition speed jump index did not correlate significantly with any of the speed strength measures suggested that the 3-repetition speed jump protocol as the ideal speed jump test to be used in measuring repetitive speed jumping ability.

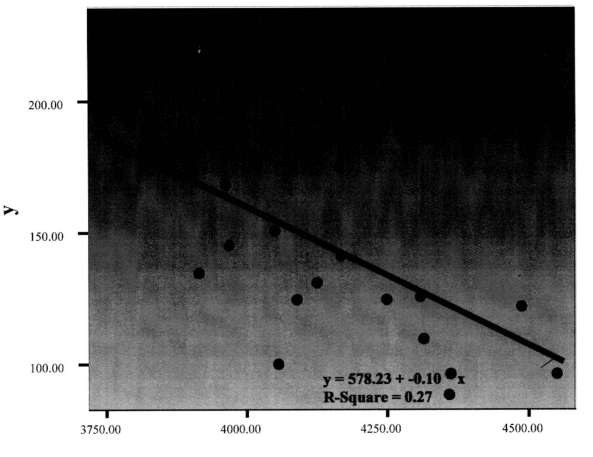

Figure 4.1 Scatter plot showing relationship between last 30m time in 40m dash and 3-repetition speed jump index.

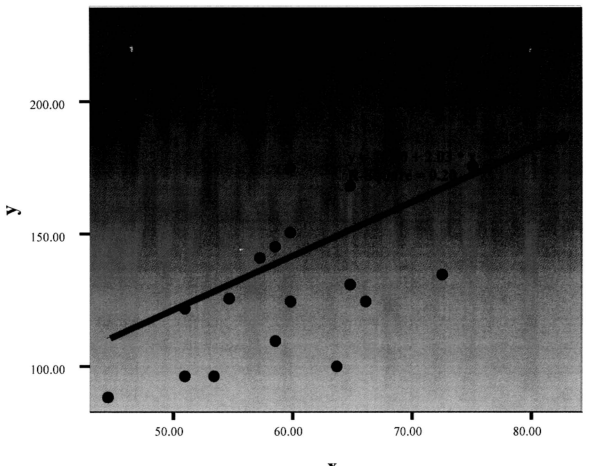

Figure 4.2 Scatter plot showing relationship between vertical jump height and 3-repetition speed jump index.

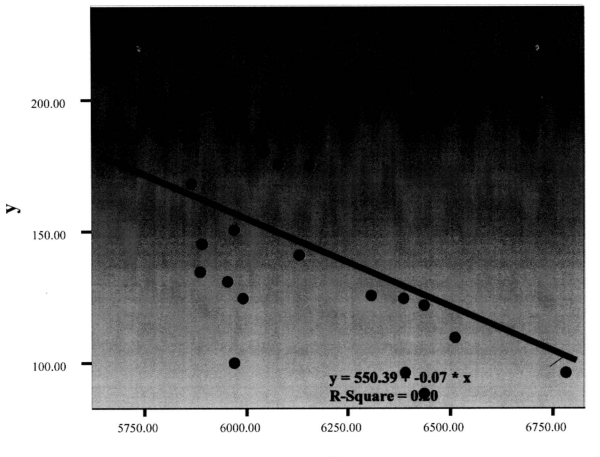

Figure 4.3 Scatter plot showing relationship between 40m dash time and 3-repetition speed jump index.